1776

GEOLOGY

UNITED STATES
DEPARTMENT OF THE INTERIOR

DI-6

[illegible]
[illegible] TUCKY
DIV. [illegible] PHY. (L-312) ANX
SMITHSONIAN INST
WASHINGTON [illegible]

Summer Collecting

M. ~~Bartoscewicz~~

Michael Bartoscewicz

Arnold Powell

766 Northeast, Md. Area. May 4, 1976

Base of Bull Mt. at Camp Holiday on Shore.

dk Grey clays at beach level
Capped at 4 to 5' by
lt. grey silt & some fine sand
lenses.

620 feet N of
STAIRS to
Beach

SECTION PLOTTED 5/24/72

766 SECTION at Camp Rodney

min mud

0.915 m

0 abt 3' below mean H.T. Level

Dark grey UNCTIOUS
(-1.07 m) 1.5 m MASSIVE CLAY
SAMP 766 b 6" w/ STRINGERS SILTY Vfg MIC. SS.
766

[0] 1.23 m

4' base of wave cut cliff is mean High Tide level will be TAKEN as 0'
CLAY becoming SILTY & lighter grey more resistant forming facet of cliff.

1.98 m [+.75 m]

6.5. becomes med grey vfg. clayey SS.

2.29 - 2.44 [1.06 - 1.21 m]

→ 7.5 - 8 SAMPLE 766 c from vfg. SS.

2.6 + [1.37 m]

8.5. UNCTUOUS med grey CLAY ALTERNATING with SILTY LAYERS & THIN 1-3" STRINGERS of Vfg TO fg. S.D. SAND.

766 d - 12' SAMPLE [3.68 m] [3.45 m]
med grey SL. reddish

base of 6' layer of
SILTY CLAY grading into
SILT at 14' med grey
with iron stn.
4.5 m [3.04 m] WITH CLAY iron stone conc. frag
14.8 [3.29 m] base of ~~laminated~~
reddish silty clay
bearing leaves.
The sample 766 e at 14.9 = 766 a
leaf layer w/
PINNAMOIDS & CUTI-
4.79 m [3.56] some 1/4 wood frags.
15.7 lavender silty clay
grades upward into
med grey sr. ss.

w/ sharp upper contact
deformed by compaction

5.12 m [3.89 m]
16.9 Top of ss. base unit
~~reddish~~ grey silty clay
PINKish w/ lignitized wood
sample 766 f at 17.7 5.4
Clay w/ silty PARTING 4.17 m

5.08m [3.85 m]

16.5. lavender grey silty clay w silty partings & lenses of vfg ferruginous yell 22 4.5 m abtd ~~4.5 est~~ ST SS.

—16.5 — 3.8 m abtd

6.43 [5.2 m]

→ 21.1' 766 g in clay bed. 6" thick

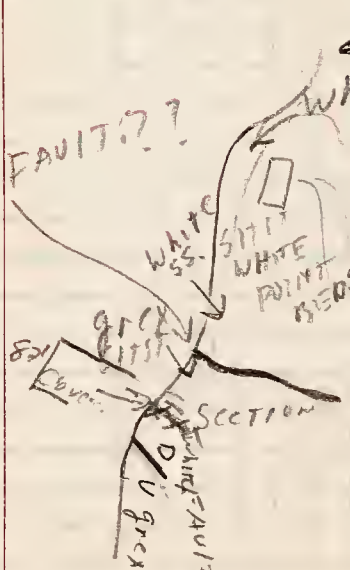
[5.23m] dark grey VNCT.
6.55 sl. silty.
21.5 clay iron stone conc.
[5.64m] layer. 3"-6" inch thick
6.86 rounded cones.
22.5 ferruginous ~~ss~~
[5.73m] clayey ss bed.
6.96
22.10 ~~&~~ clay silty
VNCT. ~~dark~~ med. grey
mic [5.73m] 6.96
22.10 766 h sample of clay. 28 cm
clay bed abt. 11" thick
grades upward int

22,
5,5

27,5

Ferrug, ss. bed
lower contact mottled
with clay upper one-
~~Thick~~ sharp
sand. If dot thins
pinching out to 0
7.45 [6.72 m] in 2" 10cm laterally.
24.4 ~~7.42 m med grey silty clay~~
24.6' Sample 766 i
from lig.
→ light. med grey clayey
silt with iron
staining
becomes sandier to
~~limonite yell~~
25.8 2 light grey & ~~brownish~~
~~mottled ss silt~~
7.86 m [6.63]
~~25.5~~ 25.8 SILTST becomes
light grey &
lim ox yell. mottled
grades upward into
vfg ss.
8.39 [7.16 m]
27.5 ss. grades int
reddis mottled silt.
8.63 [7.4 m]
28.3 Cont w a vfg
lt grey ss

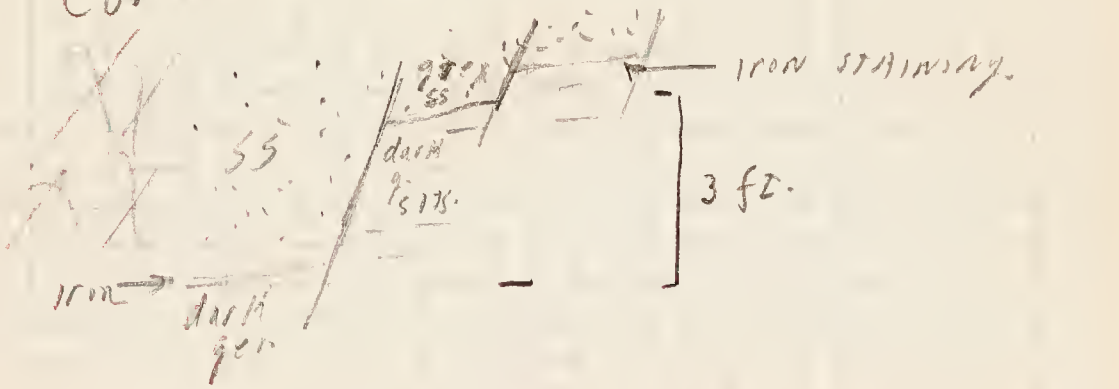
with an ferruginous basal
cgl mantled by rock
limonite in grey sand.
8.85 m [7.62 m]
above 29 sand is
limonite ~~brn yellow~~
reddish brown cdse
fg. sand.
9.3 m [8.07 m]
30.5. Top of section



N
S
gully
Sim has PX
96.

87 feet ~~East~~ South of 766

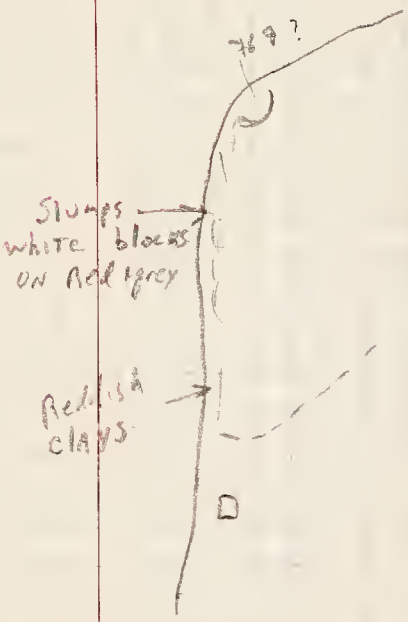
Covered



Possibility that light grey may be down faulted between bosses of grey ~~on~~ Fine Gr. Vein?

767 Rocky Point Bluff
761 ELK STATE PARK.

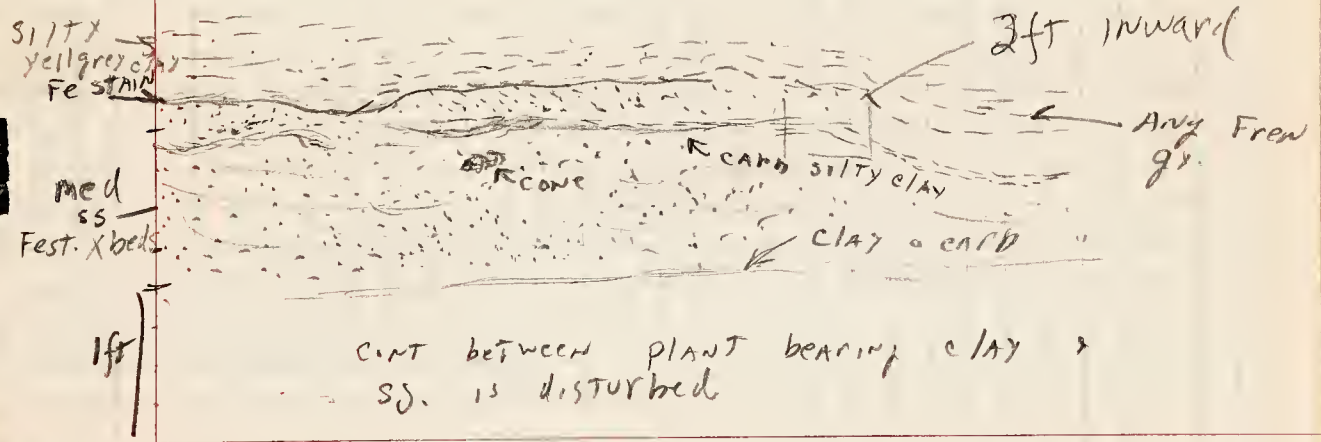
Basically a white SANDY
white POINT SEQUENCE
with the Reddish
Red POINTS PATAPSCO
with IN INTERVENING ...



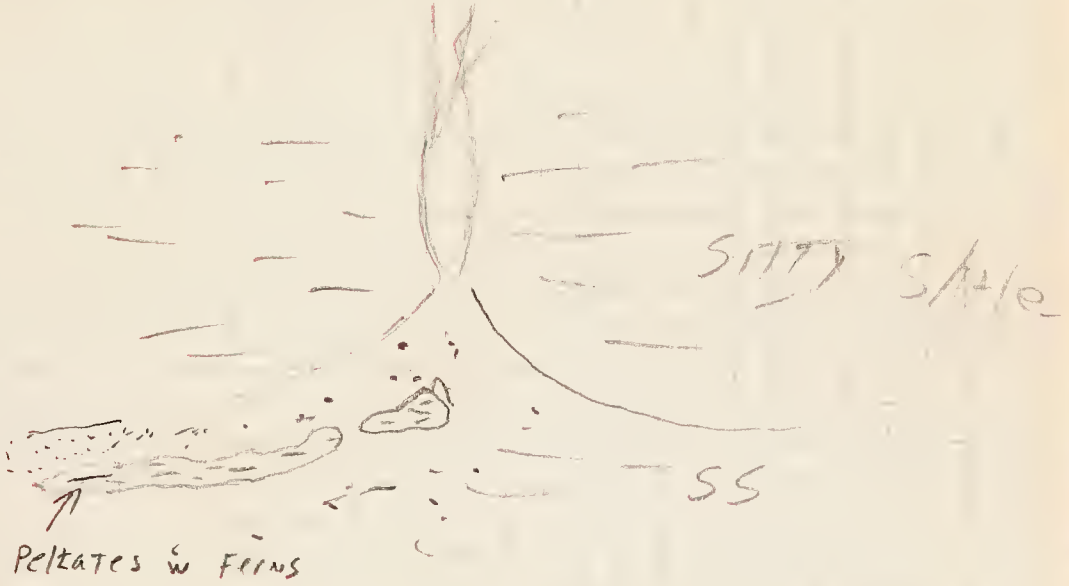
STUMP NECK locs. 7B9
7C9 b.

W. G Upchurch, S. McClammer, M. Brett

7C9a = loc 7D1C
loc.



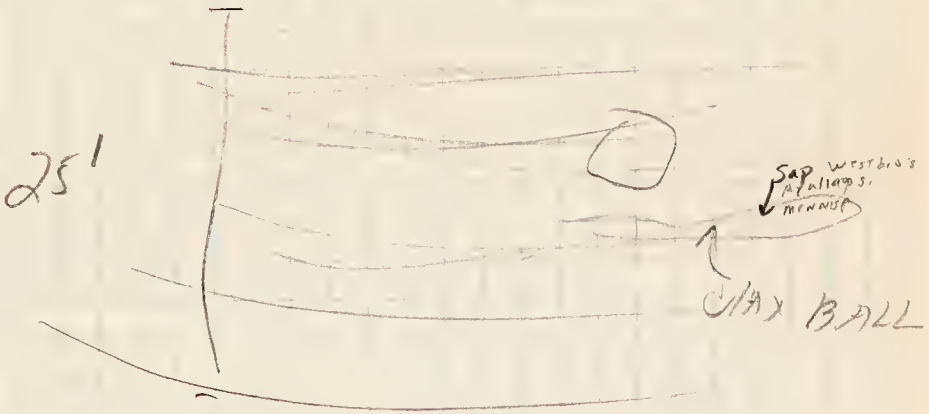
Angios in basal 4"


Silty Shale
SS
Peltates w Ferns

769c Channel 450' ft. S of 769a

Menispermites
Sapindopsis west Bros. in Red Pt Dyke

opp. 490' S of 769a

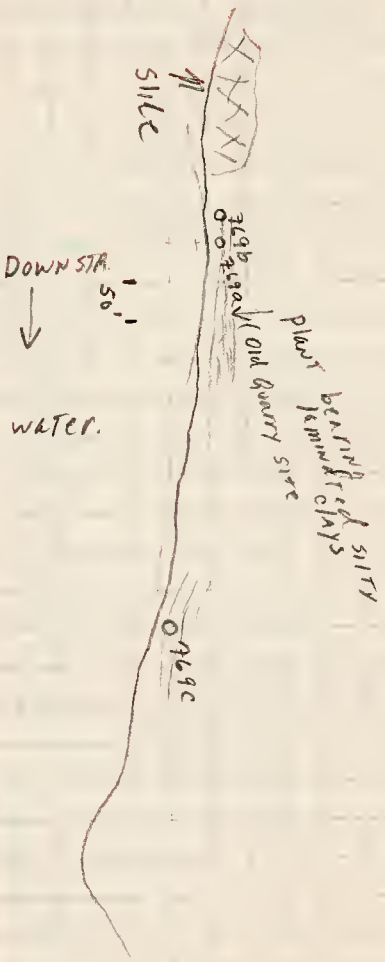


79 X C.2' south of
S of 769a

Trough X-bedded med SS.
clay galls & allochth MASSES

450
+ 46
490'

769 STUMP NECK SITES



5/7/76

7610 Northwest Branch loc.
7510

W. J. Doyle
G. Upchurch

PATUXENT MICACEOUS
W. lignitized logs x bnc.

furthest west 91° — STUMP & lower TRUNK. ± 1½' dia
93°
85°
76°
100° 3' above last one
88°
76° 3' below last one
92°
95°
91°
86°
100°
88° 6' across flaring base

103°
108°
89°

OUTCROP 35 pcs long W TO E

5/7/76

7611 PAINT BRANCH Loc.
Jim Doyle
Garry Upchurch

7611 A.- 0.5 m above
Skog. Fern Bed.
Jim Polen sample

7611 B. 3m above Skog Fern
Bed sample J. Doyle
Pollen sample

5/7/76

7612 LANHAM STATION of PENN CENTRAL

High hill

0 CAPPED w 50 feet of yell wh xbedded friable ss w. iron cemented ledges of ss some silts w. wh & reddish mottling. below this floor of old pit is mainly deep red & lavender redd mottled light yell grey clay.

looks like West Bros without any grey beds.

—

Hill directly on strike w. West Bros. pit & roughly same elev. From Darton map

	WB	Lanham
Bp of Hill	150	165
Base of pit.	100	130-120

So same elev. in Kp.

Upper Rocdale

Stop T TR 13 Wilcox
Clay pit of Marshall
Clay Co.

Up

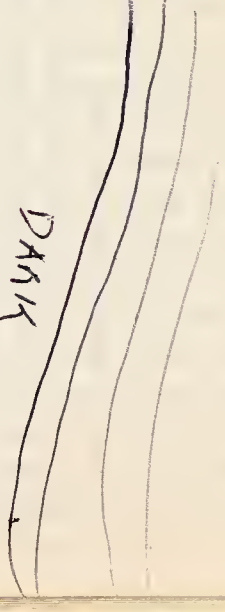
Sterculiaceae ?
Alangiaceae ?
Toothed leaf

Teeth

Agrandal
Stimulation

← actino-

Fischer & McGowan Survey of Papers.
Dun Geol. 69-72



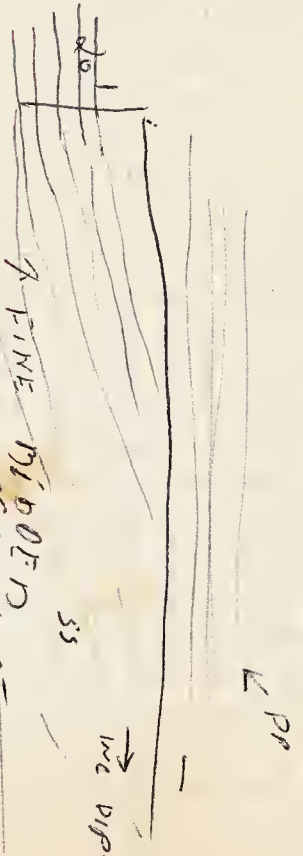
7614 LAKE O' THE PINES

SUPPOSED CRAVASSE SPLAY

THIN
THIN BEDDED Shale SLTST
SS + CARB
LEAF LAYER

Top of Wilcox
Calvert Bluff
Mbr.
LATE EARLY Eoc.

FORTIER
U of Texas
MASTERS THESIS



7414. mileage

1.7 GATE

7615 Oak Creek. NE, NW,
Sec 24. , T55N, R61W, Crook Co Wy
LAKOTA Fm.
Probably abt 15' below zop of
UNIT 6 of Jenny in Ward 1905
Sap. beluedirensis
Bottle Brush. & Cappitulum
Pityostrobus
Ferns.
Gymnos. Frenelopsis?
Sphenop.
TAX. Cone.

Fossil Pl. Collections.

Near site of Jenny's loc. 2.

Supposedly Upper LAKOTA in
Zone II-B middle
from Florin

7616 OAK Creek NV Side
NW NW 24 T 55N R 61W
Crook Co. Wyo

Pollen sample.

~~Sha~~ Sandy Shale sec. w/ thin coals below a massive ss cliff abt 30' just one of 3 prom. ss. incl. 10' red ST. 585.

6/22/76

7617 E SE corner Sec 36 T 55N R. 61 W.

Grey SILTY shs w fish scales exposed in road bed.
This is road fill!

Below This on hill shs of lower LAKOTA ±

Big Horn BASIN Area 6/25/76

Mapping of Facies in B.H. Br.

(P) - Paludal
(L) - Lacustrine
(F) - Fluvial
Congl. - Cong'l Fan.

Sec. 16 below Cong'l

Paludal in B. Creek Area
Following Creek

7618 NE 1/4 sec 11, T8S R 21E
Channel ss. TRANS, TO. LACUST.?
Siderite cones.

7619 SE Sec 14, T8S R21E ~~T8S R 22E~~
Drilling Area. Coal prospect
Paludal area
Coals dirty Carb shale
Some Channels.

7620 Seq. of Clay ironstone below x bedded
ss forming top of Hill
ss channels still lenticular.

SE Sec 14, NE Sec 23 T 8S R 21E

SW 1/4 Sec 13 T 8 S R 21 E.

7621

Channel SS. Texture
Med gr. to fg.
Non-mic.
Base
Unit generally 35-40' thick.
Upper 10'-15' Trough X-bedded
Color ...

S. Central S. boundary Sec 17
Some carbon blebs
& beds w/ mica flakes

Base is massive
Then 5' isoclinal & diapiric folded
10' thick & bedded
Above is sideritic & clay
& Then 15' of X bedded SS

7622 Hill 4320 SE, SW Sec 17 T8S R 22 E
Color & texture
Mostly massive SS.
Still.

Pl.

1241 Castaleja from mid slope
Sec. 20 ? T 8S R 22E

IN sec 20 W side of Coulee
STill (Pal. siderite Concs.

7623 S end of Bluff of LACUSTRINE
F, V, Fm.
Parllel bedded. Cont.
SS. beds w/ ripple
MARKS. Some lignite
RARE small lent. MASSIVE
0-8.6 Channel SS. ripple MARKS
// bedded SS blocky

7624 W 1/2 sec 28 Few Thin // bedded
blocky SS beds in
pred. Fluv sep.

7625 Hill Top / NE 19, SE1/4, T 8S R22E
Limonite impreg channel SS.

6/25/76

7627 Hillside exp. W. side of 50 mtn
Badger Basin.
W1/2 SE1/4 sec 7 T57N R101W
PARK CO, WYO.

Upper FU. Fm.

Possible leaf loc.
2/3 of way to top of Hill in lignitic shales

~~must come back for pollen & leaves.~~

Metasequoia foliage & cone
Sabal? minimum fruits
Ulmus leaves
Platanus (poss nobilis type) leaf
poss seeds
Averrhoites affinis
Persites aquaeus
Toothed petiolate leaf
Fish in shale w/ lignitic seams
& shrimps appears to be
associated fauna/flora

7627 - Main loc
7627-c Cuticle loc 25' below main
(CONT. on 2nd P)

H-mudst rest

7627 STRAT SECT.

Metr. Al Windsor of N. Petroleum Co

Loc. in new top of house in Starr.

0. SS, yell grey 5Y7/3, wh 10YR 6/2 fg, SA, S, massive, wh into 2mm plates, ~~calc~~ Calc cem well ind (3)

0-0.5 Covered.

2 Sh.- chlopy, Si(Ty), 5Y5/2 wh 5Y8/2 (1)

2.2 ~~ind~~ ledge (3) of SS, vfg. Calc cem, 10YR 8/4, wh, into 2mm plates, wh 10YR 8/4

2-4 mudST, MASSIVE, 5Y7/2 wh, 10Y 7/2

Hor 10Y 5/2 mudST. some LIMONITIC ST JOINTS

4.4 CLAY, Si(Ty)

5. mudST, 5Y5/2 gyp on joints

5.3' grading into SS, vfg, 5Y 7/2, w gyp on joints, rest. (3)

7627

7627a (cont.) loc. but in a lignitic shale.

7627 Pollen samples.

7627 B - Level of fossil leaves in pit at base dull grey shale with leaves.

7627 C grey shale with leaves. Ironstone septarian joints 6" above 7627 B

S... 7427. Lo...

6 m. mudst. , 5Y 5/2 - 6/2 , ...
platy ... , lime ...
lumpy ...

6.6 m ...sh. , fissile 5Y 4/2
Twh color slope ch. ... 7/3
.15 m SS, Vfg, Min mic, massive
soft (2) 5Y 6/2

8.85 ledge ... MASSIVE (4)
Vfg, 5Y 8/4, wh. 6YR 5/2
(4) friable
9.0 SS, ... (2), ~~MASSIVE~~
... mic. + ... / Po
NoW-calc 5Y 7/3)

10.25 S1757. 10Y 5/2, massive,
... (2).

10.8 ... to C/AxST.
MASSIVE, 5Y 6/2
wh. color 5Y 7/3)
11.5 becoming fissle sh
with root impressions
12 no roots. 5Y 7/2 to 5Y 5/2

13.1 Sharp contact
SS/ fg, sa, arkosic, wedge
through x bedding.
wh color 10YR 7/4) to 5YR 3/2
... Calc.

1627 (cont)

19.4 Massive, friable
Non-calc arkosic ss (2)
with occasional [illegible]
[illegible] x bedding
[illegible] 13.1
lenses 1.25 - 3.5 cm thick

From 17.0 to 19 color 5Y7/2 (1)

20.35 Clayst, silty, 5Y 6/2
w some ripup MASSIVE (2)

21.7 SS - wedge thin x bedded
fg, 10YR 7/3 - 7/4 calc, cem
[illegible] (3)

24.0 [illegible] (1), 5Y 5/2

25.1 color now 5YR 4/4 - 4/4
[illegible] lenses of ind.
SS.
wh color 25.1 - 25.9 - 5Y7/3
25.9 wh color 5Y 7/2
27 SS 5Y 6/2
27.5 ledge of SS, thin
bedded. Vfg, 5Y7/2
Calc cem SS.
wh. 10YR 6/2 (3)

27.9 ~~ft~~ friable non calc
massive ss. (1)
w thin 0.15 m ledges
and ss as at 27.5
w increasing clay above 30m
to cont w/ mudstone @ 30.4

30.4 Mudst, 5Y5/3 to 5Y4/2,
n gypsiferous. massive, (2).

30.9 Shale, chippy fissle, 5G 5/1
wh 5Y 7/2 (2)
31.3 (1)
31.5 claystone 5Y5/1
33.4 Shale chippy
33.65 ss, friable, f.g., massive
10YR 6/4 gypsiferous (1)

34.20 Sh., 5GY 4/1, fissle

36.7 Sh 5Y 4/1 same as above.

37.3 Sh becomes sandy
laminated fracturing to
39.65 to 40

57.6 SS friable (1) non calc.
10YR 6/4

3627

6/28/76

3[illegible] [illegible] SS, [illegible] 5/7.5Y, [illegible]
5YR 6/1, (1)
[illegible] upward [illegible] a
[illegible]; 5Y5/1

HS.3[illegible] [illegible] ind. ss, X bedded
[illegible], 10YR 7/4, non
[illegible].

[illegible] silst, [illegible], [illegible] 7/2

HS.4 SS, ind. non, calc, base
ind. (2), from HS.3
friable (1)

H1.75 Sh, fissile, 5Y 5/1

H3.2 SS, Vfg (2) friable w [illegible]
[illegible], 5Y 7/2, N[illegible]
Some Vfg.

HS.1 SS grading to a [illegible]
Clayey. 5Y 3/1

HS2[illegible] Sh, lignitic, [illegible], [illegible]
w [illegible]
10YR 6/2

PT 7637 HS.8[illegible] lignitic, clayey, fissile,
Roll in 7637A level of coaltic log
7627 a.

46.27 Sand (fine)

46.1 Sh, fissile, w/ roots; & burrows
KT. 5Y 4/1

46.6 Cl/Si, gypsiferous, 10YR 7/2

47.5 Clay bed, sh, silty
5YR 5/1
Cms. sm. lign. at 48.95 to
49

49.1 SS, ind, vfg, 5Y 7/2 to 5Y 6/4
X'bedded, forms ledge (3)

49.6 Cl/Si, clayey 5Y 5/1
Thin lignitic coal w
fossil wd at 50.35 to 50.90
50.35 Coal w SS 2.75 m
To w of base of (1)

52.7 SS, Friable, fg, w/
Lign sh interbeds. 10YR 5/2
52 clo SS.

52.7 Mudst, chippy (1), 5Y 5/1
gradin[illegible] to fissile sh
[illegible]

[illegible] SS, vfg, (2) massive, 5Y 7/2

54.3 Clayst, silty, 5Y 5/1, gypsif.
55.3 becomes fissile sh

27.7636
76.1

Sec - 7627 Cont. 1/28/76

56.75	S1 1TST, Chippy, 10YR 7/4, interbedded sey of S 1TST, Sh, f ledgy bs, 0.2, 0.8 m thick.
	S9,7 Harlem FS UNIT (2) VFg, massive, Dimonte ST. 5YR 5/6
60.4	Top of FU. section Boulders of alluvial gravel on cres. surface
61.1	Top of H.11

Cores of Isc 7627

Metasequoia
Pinus
Averrhoites
Sm. mine Act.
Persites
A
B
(B2)
C
D

Eol
meta
Pinus

Ilex

7628 W side of [illegible]
Fort Union
Prob NW, NW, [illegible] 22 [illegible]

Flora [illegible]
[illegible]

Fossil Cl. Metasequoia [illegible]
[illegible] & Salix leaf
[illegible]

Pollen Sample

[illegible]

7629 [illegible]
[illegible] Metasequoia
[illegible] leaf frags
SE, SE, Sec 16, T 57 N, R [illegible] W.

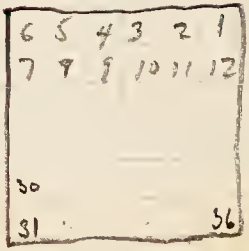
7630 N wall of [illegible]
big [illegible]
SE, SE, [illegible]

Poor PLANTS in a band
Pl. Latae
Metasequ.
Cercid. [illegible] dominant
[illegible]

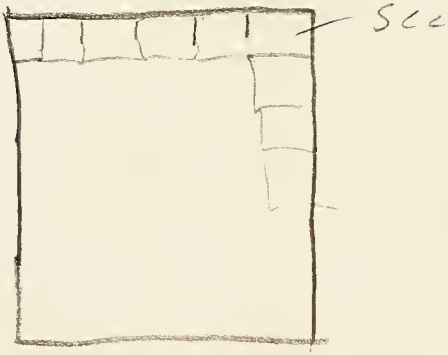
7631 | 1/2 m/e W of S of Powell Road

T56N R 101 W
Park Co W/o.

7632 | Foster Gulch 100 ft. [illegible]



R 10 0 W



T 60 N

7633 Below A stringer Ss. of Virgelle Fm.
SE¼ NE¼, NW¼, NW¼, Sec 31, T 5 N R 99 W, Parish Co., Wy
E E on [illegible] ELK BASIN.

Silty & sandy beds of Abundant ss lenses in a mica [illegible] interval above Virgelle ss [illegible]

Platanoids.
+ Numerous others
Diverse Flora.
LARGE leaves

Urged 7/19 + 20.
Platanoids
[illegible] Also Fern
like Salix type.
+ others - large leaves
Quite Sideritic [illegible]
[illegible] large lvs.

[illegible] layer mostly Metasequoia
some Cercidiphyllum 2 spp.

7/1/76

Willwood Basal Exp in Badlands
NW Sec 15, T 56 N, R 101 W
Park Co Wyo

Willwood SS: massive to xbedded, med to coarse, Arkosic, micaceous, red wh, lenticular, in a lseg of clay st, & sh, some red banded much slickensides, some carb bands. No IVS.

7634 Willwood Fm. Center E 1/2 Sec. 16 T 56 N, R 101 W, Park Co, Wyo
Clark 15'

KU 7632 = Fossil Pl loc in silty bed above friable SS layer

Platanus reynoldsii
Cercidiphyllum fruits
2 other leaf types

Come back

7635

Bullwood Fm
Center sec. 10 T 56N R 101W
Park Co. Wyo. CLARK QUAD

Carb zone [illegible]

[illegible]

[illegible] or TAX
Unknown leaf Betula or
Corylus.
Maple samara.

No Foci indicated.

7/2/76

BUTTE IN Sec. 20 T56N R 101 W.

Barren Willwood BUTTE capped w x bedded ss. channels sep. by mudst. + sh. Lower BUTTE mostly red banded sh + mudst. with fewer channel ss. lenses.

dip - abt 12° to SW.

7636 center W 1/2, Sec. 11, T 55N, R 102 W

vertebrates abt. 75 feet up cliff dip 10° SW.

Below silTST Willwood.

b 35' higher Celtis seeds in mudstone 7/2 + 5/76 root surface blac

7/5/76

[illegible] Seeds on [illegible]
slope on grey [illegible]

[illegible] above base of
[illegible] below Vert layer

7636

CAPSULE w/ black STRIPE
gathered from MUDSTONE
MATRIX

7636d Mollusk abt 3m above
lower Celtis bed.
11 m below Vert layer
at 7636

7636e Bone Bed 1m above
Original bed at 7636

7636f. Mollusk bed
IN. mudstone
~15m above Bone
bed at 7636.

7636g. Mollusk, Celtis & Jonin
layer 30m above 7636

7/5/76

7636 TRANSECT TO POINT 5500
X ~ W Clark Quad.
Sec H, T 55N R 102W.

no fossil leaf impr TO
this POINT
SS beds NIT W.
clayst & mudst
mollusk, shells & Celtis
seeds.

7636h ANOTHER MOLLUSK CELTIS
layer. 170' above
7636.

7/6/76

7637 Center, W½ Sec 25 T [illegible]

Wilwood 15Th Teeth, Ca 1715 secs, Mollusk [illegible] 7636

7637b Mollusk [illegible]

Azimuth 313°, W 5°30'

7636 ± Center W½ Sec 24, T 6N R 101W PARK Co Wyo

* Vert Teeth, Base of Lower Ss Wilwood

7639 SW, SW Sec 26 T 5GN, R 101W PARK Co Wyo
Vert Teeth - Carb Zones IN SITST

TO MINE AT PT. X
on Sec 26 at 420
TO PT. 2634 at 301°

7611 Well Site on Gold Creek.

6000' To Granitic frags.

600' Lignite some ~~to~~ qtz

Upper Cuttings
Porphyry

Top Jur. clay 8,700
Madison 13,600

7642 SE, [illegible]

PLANTS 1249 & 1250
CLAY slope IN Willwood.
NE Sec 34, T 56 N R 101 W
WYO.

1251 HAPLOPAPPUS on sandy slope same loc.

1252 ATRIPLEX procumbent, shrub sandy surface slope.

1253 SARCOBATUS on sandy slope

1254 White umbelliferae on sand.

1255 Spurge on SS.

1256 ATriplex } SANDY slope bare
1257 ATriplex }

7/8/76

7643 NE Sec 34 T 56 N R 101 W.
PARK Co. Wyo.

SANDY, SILTY, yellow grey wh
seg. above, first of
flt'ed yellow, cliff forming
ss. + 15' above ss. C

7644 Butte on divide center
NE Sec 34, T 56 N R 101 W

Single [illegible]

BUTTE 4900 in SW, NW, Sec
34 T 56 N
Red banded seg. capped
by x 20' [illegible]
Terrace on each BUTTE
sits x 20' to 40' above
34 is [illegible] 351-450'
x bedded [illegible]

7/8/76

7645 Spur of Willwood escarpment
SE SE, Sec 33, T 56 N, R 104 W
PARK Co WYO

CARBONACEOUS mudst
abt 60' above the
top of prominent SS
forming the Willwood
Terrace

Large Celtis Seeds +
Jeeth

7645

RT. 7635
Barren of Pollen

76

7646 Center N line Sec 16, T 58 N,
R 98 W [illegible]

Lignitic Sequence [illegible] Gastropods
in silty ss. Carbonac-

ON HUNT CREEK
AT MENTZELIA SITE

Lower EXCAVATIONS TO
S. AT LEVEL CONTACT
TO [illegible] SAND
SCAPLIN HOLLOW AND
TO THE DARKEST SOMBER
LEVEL

2/9/76

76 44 Bobcat [illegible]

EARLY PALEOCOWE W/ LATE K
CONTAMINATION R.S. 10/19/77

7647 NW, NE, Sec 12 T57N R100W
PARK Co Inyo - EAST

7648

4-19 Bobcat Pass [illegible]

Bluff to E side of Pass

NW, NE, Sec 12 T 9S R 23E

Carbon Co, Mont.

5'

GINKGO leaf w/ CUTICLE

KT. 7650 7/9/76

UPPER [illegible] FORMATION

FORT UNION Fm.

From CUTICLE Coal

7650

Basal Fort Union Fm. just above ( )
Lance Contact. Center Sec. 1
T 57 N, R 100 W. 1-3' above Lance

[illegible]
EUCOMIA [illegible]
[illegible]
VIBURNUM [illegible] ? (precursor)
[illegible] ANTIQUUM
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Amoco Production Company
Eber Unit No. 1
Well No. 358
Federal Lease, Cheyenne (5711)
SW/4 NE 4 Sec 1 - T57N - R100W

Fossil bearing UNIT a THIN br. ~~[illegible]~~ med grey SITST
W. siderite ~~concr~~ impreg SITST
~~base~~ at base
SITST MILACEOUS

IN SECTION 7651

51

SECTION 7651

STARTS IN ~~NE NE~~ Sec 12, T57N

* Ammended in Notebook #2 R 106W
OX Az 136° W 18.0 Park Co Wyo.
1e 2140
2430

Meas on Tape Av. dip at 23°

STATION			DIST	Az	∠
↓	(0) TO	(1)	53.3'	42°	16°20'

START IN LANCE FM.

5.2' ← on tape top of SS. wh. 5Y7/4 fr 5Y 7/3 Ledge of massive, f.g. non calc. ss. Rest. 8
Sharp cont at 5.2 w. soft ferrug. thin bedded ss grading upward into 5Y7/2 chippy silty sh w fig. interbed 8" Rest. ~2

28.1' SS. thin ~~TAB~~ x lamin., vfg., non calc
5Y 8/2 wh. 5Y7/2 R 5
upper 1' becomes. massive irreg wh. vfg.

33.8' Sh. & siltst, chippy, rarely lignitic
10YR 5/4

44.2 SS. vfg., x laminated (tabular) w/ ~~Sh~~ pl. fr. ls. R. 6
non calc. FR. 5Y 7/2
wh 5Y8/2 top becomes thin bedded.

46.5 SS, friable, chippy silty, lig sh R-2

761

BASE

			D	Az	Al
① 53.3	① to ②		-100	45°	-12°

2.7
to 33
first k/r.

SS massive ledge R-1/2
fr 5Y8/1 wh. 10YR6/2
INTERVAL CONSISTS of SS IN
MASSIVE ledges up to 12' Thick
5Y7/3, ~~vf~~ to SS R-1/2
w/ pebble congl, NON ~~CALC~~
W/ INTERbeds of SOFT FRIABLE
bedded ss w/ [illegible]
[illegible] 1'

100'

②

D	Az	Al
100	48°	10°40'+

~~top of last~~
SS. ledge below
this R

SC from 100' to 204' ledges of
sl. calc V fg ~~to~~ fg 5Y6/2 wx ~~to~~
SS w/ FRIABLE SS.,
Strike - ~~to~~ from ~~to~~ 10/5/2
SC ledges to 2'
INTERbedded w. 5/5Y5/2,
& CARb, Chippy, SILTY to SG 5/1

R 8-1

7651

N-3

R-2

5Y 8/1 [illegible] calc. wh.
[illegible] thin [illegible]
[illegible] 10 YR 8/2 TO
10 YR 6/2

TOP of TREES IN GRN
Could be top LANCE

Thin ss. ledges as at 27.8
interbedded w friable ss
some sid cones.
TOP of LANCE
[illegible]
R-3-2

613
7651-a → [illegible] FORT UNION
Fm LEBO Mbr.
Shale chippy N-3 w/
5R 4/2 wh sid. cones
up TO 1.5" dia.

76S1

DIST IN TAPE		D	A2	
	(3) TO (4)	88.1	15	33°50'

0 STA 3 Sh., CARBONACEOUS
LITIC, N-2, Wh. 5Y6/1
w/ grn & slt Yel lithics
dkgy wh. CALC.
some siderite conc. R-3
TYPICAL "LEKO" SWAMP FAC.
57.3 siderite conc. zone 8" THICK
66.4 SS Thin bedded SS Ledge.
fr. 10YR 8/2 R-5
to 10YR 7/4
calc
Becomes Ferrug. in
upper 2' below STA 4.

~72.4 IN Ferrug SS

STA 5 IS 3 M above STA 4
AT TOP of Ferrug SS.

(5) to (6) D A2 ∠
(3) 96.1 49° 21°40'
SS vfg. CARBONACEOUS
5Y6/1 wh 5Y8/1
grading upward IN 10' TO
5Y4/1 SILTY Sh chippy
some mudst lamin beds
22.6 Siderite Conc layer

2- Sd vcf, to s.lt, clayey
sh & [illegible] silt
wh. N-6 & 5Y 6/1 lw 3 foot
bands.
Lith Dom 5Y4/1 clayst.
w scattered c in to 2'
sil cons

2b

b

100 39° -10°40'

b + 4" sil conc

1918 CARB sh lam fissile sh w
fossil lvs. & typ lvs fragments
5Y4/1, wh N-7

26'2 Top Bet to lith of
SILTY CARB seg. sh.
N-3, wh. N-6

#2 SY 8/1 silt w/ ⊙ frags
wh. 5Y 8/1 in the
[illegible] is this
[illegible] 3' bed.
[illegible] abt 30' TO (8)

(7) TO (8)

100 39° -3° 10'

0 (7)

[illegible] below

[illegible] abt 1/2 WAY
between (7) & (8)
5' lens of thinly x-bedded
calc, fg., 5Y 8/1, wh. 10YR 7/4
[illegible] ONLY.

above 60 5' bed lignite
thin carb, fissile sh.
some sil. Cores to (8)
fig. 2.3 TO
BASE of lign. seq 2.3 m
Below (8)
FLAT level at
A2, 40°
lign [illegible] CARB fissile sh

76 S1

L 1 72 and 10 1.5°

L 100 AZ 221° -2° 30'

(8) INTERMEDIATE CAIRN SHOT
NOTE: WHITE CALCITE
1 FT
DUE SID. CONCL
SOME FRAGMENTS OF SYS/2
S1 SILTY CLAYSTONE.
WHITE LIMONITE ST.

97 Lig.

79.5 (8) d - shippy ppl carb. shale 1c 3

L 100 AZ 248° -5°

10.4 S.S. X bedded, locally [illegible]
[illegible] Lig. Calc

13.8 Top S.

27.5 to 28.9 SS. Ledge as at 10.2
lenticular 11th above
as at 23.6

81.4

87.3 lig.

7651

89.4 Cob. Tide.

92.7 Shale as AT 2310

100 (10)

10 to 11 D 100' Az 270 ∠ 15°

0 - (11) as AT 2316 wh colors
Some lignitic abt 1/3
of the way in a
band
wh. 10YR7/2

7651

Distance on Tape

(11) to (12)

JJ 233° ∠ -5°10'

0 (1)

AS AT 26.3 to (12)

Std cones, with cable [illegible]

2' lightical zone #5

251

(12) to (13)

D	AZ	∠
100	208	-7°10'

0 (12) AS AT 26.3 TO 13

(13) TO (11)

D	AZ	∠
43.7	224°	-3°30'

0 (13)

15. to (14) covered.

43.7 (14) (15) to (15)

D	AZ	∠
91.8	237°	30°

0 (14) covered. as before in 13-14 interval

covered but app. Typical
Lebo as
with ppp as at 26.3 etc.
covered.

50.6 Chippy carb. shale as before

at 80. Chippy Silty shale mostly covered

at 84.6' Same. " LEBO.

86.0 SS- ledgy Thin x bedded, f.g.
fr. 5Y 8/1 wh 10YR 6/4
NON mic.

end at (15)

5

This is the first of a
number of ss. ledges
which appear in upper
LEBO.

		D	Az	∠
(15)	TO 16.	100	252°	-17 30'

0 (15)

SS as STARTED at 86 - (15)

29.3 top. SS. INT covered but Shaley etc as at 26.3.

00.

covered

		D	AZ	∠
(16)	to (17)	100	218°	19° 30'

0 (16)

from 12 soft to rare sand grains up to core. shale at 4.30 SS clayey, vfgl 10YR 5/4, R-2

at 33' clay w/ sandy [illegible]
wh. of Slope 5Y8/1 becomes
Inc. carb. upward.

33. [illegible] carb shale. w lignite
stringers.
wh color to (17) 5Y8/1

[illegible]

Fuse. [illegible]
[illegible]
calc sid. concs.

[illegible] [illegible] 2in x-bedded,
calc, 5Y8/1 wh, non-mic.

7.6 ll bedded mudst, 10YR6/2

(17) to (18) D 100 AZ 211 ∠ 17° 20'

(17)

2 S[illegible] & thin bedded sltst. impreg SS. lvh TO 10YR 6/6 R 4

11 top [illegible].

[illegible] wh 5Y7/2 R-1 becoming gummy CLAYST in upper 2ft below lig.

68.5 lig. grading upward to carb fiss sltst

73.0

73.0 to 77.7 m.gr SS. [illegible], wh 5YR6/1, very lenT calc, very thin & lenT, 5Y8/1 f.g. lX bed [illegible] Clayst lam t.w. calc sltst

[illegible] at 90.0 - grading [illegible] claystone [illegible] to 15)

98.0

100.0 (T)

		D	Az	∠
	(18) to (19)	75'	210°	28°-30'

0 (18) No change to 25. T.

R-2

Chippy clay ST 5Y4/1
wh. sl. 18 to 19 - 5Y7/2

25.0 [illegible] R-2
grading upward. ~~beyond~~
lw upper 2' to clay ST
w some 3" siderite ~~at~~
at upper

4.5 55. to (19)
fg, sc, ~~carb~~. calc, trough
x-bedded, siderite
color N8 wh 5YR 6/4

		D	Az	∠
	(19) to (20)	100'	215°	+4°30'

0 (19)

22 [illegible]

Above 22 clst. carb. shale - lig 10 11 thin

rare sil. nodules R-1

wh 5Y 7/2 to 5Y 8/0

55. Fri. SS. R-2 Sil Impsn. in part. vfg, ℄ 5Y 7/2

80 clst. Mdst, Carb sh. some thin lignite bds.

100 (20)

(20 to 21) D 100 AZ 102° ∠ 10° 20'

1m vert height above
(21) f.g.) 5Y 7/2 wh 10YR 6/2
Festooned & Tabular x-bedded
R-S1 S

CST. STATION (21A) offset on
Top of SS. 1m above

		D	AZ	∠
(21A)	TO (22)	100	221°	7°.

0 (26) - top S.S.

Sequence Fri, Fine grain SS.
vk. Color 5y 7/2

25.5 to 30.0 Thin SS. lobe & Sid.

~~Some Marl~~ General Lith. CLAY 5Y 6/4
CST. More Sid. Conc.
thin S.S. Ledges(2) between
36 & 65. grading laterally to Sid.
Some LIGNITIC STRINGERS
& CARB SH 3-6" THICK.

D (20) Core - [illegible]

R-1

cont'd [illegible]

Core: 5Y

fr color 10YR 7/2

w gyp

wh color [illegible] 20-61

10YR 6/2

51.0 to 51.6 [illegible] ledge [illegible]

Lens: All [illegible] rc

71.0 [illegible] 5Y 2/2 to 80.0

[illegible] rc, friable

Uh color 5Y 7/3
mudst. grade upward to
clayst then sh then
thin lyr. seq repeates
w sltd cores. &
thin ledgy ss.

68' clst.
some carb. layers. w/ thin lig
3 thru
& carb. shale.

88.7 thin bedded ss.

93.9 interval as below. at
30

100' (22)

(22) to (23)

D 160 ft. A 2 192° ∠ 4°10'

(22)

Same interval as 21a From J

52 to 57.5 – F.S. S.S. R. 2

73.6 to 96.0 Thin S.S. Ledge Lot X-bedding

Some Sid Impreg. layers in S.S.

		D	Az	∠
(23) To (24)		100	203°	26° 25

0 (23)

UNIT as belo.

K-J

62. Bcoals ~~Kcoals~~. Carbonac
Uh color of Slope 5Y 7/2
5' beds of Friable ss

INTERbedded w/ lg
& Carb shale &

72 lig.

74 lig N 1' w 2' bed fissle
Carb sh w plant
frags.

77.5 Fri S.S. R-3.

88.5 Fissile Sh.

92.8 Fri S.S.

100. (24)

(24) to (25) D 17 AZ. 194° L. 24°58'

0 (25)

8.- F(s). S.S. grading upward to c/st. at 8.

15.9 S.S. Ledge. F(s). calc, x bedded F(s). 5YR 8/2 wh. 10YR 6/2 wh.

Continued on Book 2

7652 Sidney Basin [illegible] (Dist. 7699 (old 72155))
NW, NE, SEC 12 T-9S R-24E
[illegible]

7653 - Cuticle locality ~~West~~ East of Bobcat Pass cuttle loc. NEAR Center N Bdy SE 1/4, NW 1/4, SW 1/4 Sec 7 T 9 S R 24 E
JJH 3/11/01

Ginkgo
Conifers
7653 b - level of Conifer Cuticle from Summer of 1974.

7654 - Beltry Road Cut - West of Beltry Center on Cody Rd

Cercidiphyllum - leaf fossil
Equisetum
Algae

7634 Road Cut [illegible]

near E Bdy NW 1/4 Sec 23
T 8 S R 22 E
Carbon Co. Ky.

[illegible]

[illegible]

Mollusks are [illegible]

7655 Fell Creek - Lance Fm ~~40'~~ below
Road cut just below hill w/
SAGE ⚠ Stat in NW cor
SE 1/4 Sec 31, T 23 N R 68 W
Park Co. Wy. Garland Quad.

7652 Lance Fm, Carb silty sh.
18' bdw. First Ignite of The
Fort Union Fm.
RT 7622

Below this point Typical
Lance Fm greenish SH
to sltst, Carb shales but
no lignites. Ss. Fine
grained, ~~wh~~ rusty y yell.
Cretaceous pollen R.T.

7653 Fort Union ~~Fm~~ Brown at
base of First Ignite
sltst ~~clean~~ to Yellow
& ss rusty wh bedded.
Tabulan
7654
Sample 18' above Prev.
Sample from ~~Ft~~ Ignite base
Previous sample in prob
F.U. ~~Fm~~
Lignite coal & Carb shale
Early Paleocene Pollen R.T.

765 [illegible]

[illegible] 5' thick yellow
[illegible]
41 above that Lignite
& silty sh bearing.
[illegible]
PLATANUS
& Hamamelids. 1 sp

765 [illegible] NW NE Sec 36
T 37N, R9E [illegible]
[illegible]
Lignite 5 ft above yellow
massive [illegible]
base of F.U.
2pll. 012786 This is actually well above base TFU
Pollen Sam. [illegible] ST 7624
5' above base F.U. almost barren of pollen

765 Below massive yellow
Med grained [illegible] in FU?
A greenish silty lignitic
clay. Typical of Heil
Creek.
NW, NE, Sec 36 T 37N, R9E
[illegible]

7651a Sandstone below - not exposed
yellow shale - 6 ft
yellow shale - [illegible]

RT 7625 BARREN of Pollen

7651b - 13' below TOP of
19' below Samp 7651a

14' above base of F.U. fm.

Fossil leaves
Cercidiphyllum
Platanoides
Juglandaceae
Carpinus

~~Scott~~ CAR
EARLY Paleocene Pollen RT

15' sandstone 12'

w conglomerate

RT 7627

RT. 7627 E. Palec →

This

Sandy [illegible] T5N, R5W
Park Co.

This is equivalent to Ign at
417 m in Sec 7651

7651-a Base of Sonora 2680

RT 71, 643

Mid Pal. Pollen RT

7651-b Top of Black Diver

Ck Shdy NW¼ NE¼ Sec 12

RT 7651-

Top of Sonora 7651-b

Approx 200' above base

Fort Union

Mid Paleocene Pollen RT

7661-a Serendipity Summit

RT 7650

Mid Pal Pollen (Guess) very poor sample

7661 b Serendipity Summit

RT 7651

Barren of Pollen

Stand Collec

Loc. 7631 ✓ Locality RT 7632

Pollen Sample from

Loc. 7631 RT 7633

Pollen Sample

from highest lignite

zone in Williston

7662 yon. (RT 7631.

Pollen [illegible] below. [illegible] with 30'

55 layer [illegible]

Above cliff [illegible]

red. bands [illegible] cliff

RT. 10/19/77 Agents 7662 Barren of Pollen

Fort Union
Mt #1 Co.
7641 Foster Gulch
BT #641

1ft lignite bed in Sh & (-)
[illegible]

Possible Thin walled algal
CYSTS no pollen
B.T. 10/19/77

7627 = RT 7636 Barren of Pollen
Alnipollenites only rec. R.T. 10/19/77

7663 N. end of road cut ~ mi S.
of Belfry on Belfry-
Old
= RT 7638
Mont Hwy 397

NW¼ NE¼ S 23, T 8 S, R 22 E
Carbon Co. Mont.
Possible Thin walled algal cysts no pollen
Near Base, of Belfry
Fm.

7663b On N. MARGIN of Lake Beds. within ¼ mi
toward N end of Road Cut
2 mi S of Belfry
gyp 30' above 7663a
wh, grey to brown
organic plastic clay
2.4 Thick.
= RT 7639

R.T. 10/19/77 reports late Paleocene
pollen

7663 Top of Red Lodge #3 ?
Coal & overlying Sand. Sec
[illegible] T5S, NW¼ (SW¼ Sec
[illegible] T5S R21E, [illegible]
Upper Ft. Union Fm
IN Foster Gulch

RT 7612

[illegible] a bone coal Dickie (
up outside of the adit.

7642-C
All 7642 samples barren of
pollen RT, 10/14/77

7666 Top [illegible]

RT 7643 a
LATE PALEOCENE Pollen R.T. 10/14/77
7666 Base [illegible]
IN Foster STRIP Mine
SW, SE [illegible]

RT. 7643 b
LATE PALEOCENE Pollen RT. 10/14/77

7667 SE, SW, Sec 14, T 8S, R 20E
50 m. W. of Fence, Junc. in
Meetsee Trail, Carbon Co.
Tolman Flat. Quad.
= RT 7644
Yellow grey SILTY CLAYST.
w. Carb. plant frags. 2 ft
2 ft above ledge of
yellish. arkosic, m.c. SS.

LATE Paleocene Pollen R.T. 10/19/77

8/8/76
10 FEET below Top of hill.
7668 Slope 20 meter East of Meetsee Trail
Center N. NW¼ NE¼ Sec. 23, T 8S
R 20E, Carbon Co. Mont.
Tolman Flat.

SLTST w. PLANT frags & 8/8/76
lenses of floating SS
grains. Microfloral
= 6847
PRACTICALLY BARREN of Pollen
7669 Lignite 3' above SS ledge 8/8/76
151 W of Meetsee Trail on
Knoll, C W½ SE¼, NW¼, NE¼
Sec. 23, T 8S R 20E, Carbon Co
mont. Tolman Flat.
~~Frac~~ BARREN of Pollen

9/8/76

7672 = RT 7649

Clark Fork Canyon.

In Clark Fork Conyl. of
Zhr Fort Union Fm.

At old Fossil Site
G853

C, W 1/2, Sec 36, T 57 N, R 103 W
Park Co. Wyo.
Deep Lake 15'

Barren of Pollen

7673 = RT 7651 C-SW 1/4, NW 1/4 Sec 7 T 9S R 94 E Carbon Co. MONT
HUNTER'S CREEK Q

Slightly carbonaceous shale
app 7' below ~~top~~ Top of
SS. MAPPED as The Top of
The LANCE.
Wh Color of Slope precursl
yell w Lepcorn erosn.
a sample was taken fm
a highly carbonaceous
interval ½' of Lig and
Shale

R.T. 10/19/77 reports early to early middle Paleocene pollen.

7674 = RT 7652 Center SEdge SE 1/4, NW 1/4, SW 1/4 Sec 7, T9S R94E PROBable lowest LIGNITE IN FORT UNION Sequence Section measured from this place in gulley to the E a short distance [illegible] app 50' below coal [illegible] Carbonaceous [illegible]

Pollen - RT 7650

Early to early middle Paleoc pollen R.T 10/19/77

7675 Shank of Cooler NEar NE Corn. of NW¼, SW¼, Sec 3 T. 9 S R 24E! Carb Cs! Hunton? C.

7675a = RT 7653 Pollen Sample. Probable K. in Lance at least 10' below RT 7653 = 1ith. dark grey Clayst. breaking into Angl. frags.

Earliest Paleocene - older than DS77 Wit 7673 or 7674

7675b Leaf horizon in S.I.S? lens. 3' below. ~~Type~~ Carb S'ly. at 7655 or 7675a.

Belfry Cut Trail

[illegible] Cave Trail
[illegible] Belfry Cut [illegible]
[illegible] Cut [illegible]

R. Tschudy reports a Conglomerate
at base of one of 6 [illegible] in
Belfry CUT INDICATING
either scour & fill or La
DASTream.
Pebbles mixed, NOT CLAY.
CLAY Pebbles.
IN Bluffs below road.
7/9/76

Congl. on second look
turned out to be
Shell ASH w shells
looking like pebbles

8/8/7.

7678 Bank on W side of Meteesee TRAIL
C S, Rdy NE¼ Sec 23 T8S R.
20E. [illegible]

Very Bally wh. clay
Between SS Beds
~~drop~~
30m up the road strike off
3½° dip 29°
Madison [illegible] Dol POST.
Possible
~~Probable~~ [illegible]
SS. however [illegible]
Barren of Pollen

7671 = RT 7648
Top of Gold Creek Fm
Near C WBdy SE, NE, Sec 11
T 9S R 20E.
[illegible] TOP of Exposure of
of Gold Cr fm.
TOLMAN FLAT.
CAMB SIL. OUTBOY.
[illegible]
Barren of Pollen

7676

= RT 7654 zone. exposed.
Lowest Carb ~~Layer~~ in Fort Union ~~Section~~ @ NE, NW, SW, Sec 6 T8S R23E, Carbon Co. Mont.

Hatcher PRSS Q.
In an interval of Arkosic med. Gr. ~~Salt~~ SALT & Pepper SS.
Chippy med. grey Fe stained clayst.

Platanus lus
Cercidiphyllum fruit

Early to early middle Maastrichtian

Collected in New Orleans
5/29/76